

CURRENT TRENDS IN CIVIL ENGINEERING

Вінницький національний технічний університет

***Abstract.** Architecture and construction have changed over the years. As new technologies and materials become available, and new designs and planning become more popular, our perceptions of designing large buildings are constantly changing. The rapid development of innovations in construction has highlighted the need to study current trends and implement global and domestic achievements in construction, aimed at developing new materials with improved quality, functional, price and environmental characteristics, improving the efficiency of existing materials. Let's look at some of the major trends and tendencies in construction and architecture [6].*

Key words: modern tendencies, construction, automation, drone, artificial intelligence, advanced technologies.

Formulation of the problem. The importance of the construction industry is that construction is interconnected with virtually all sectors of the economy, as it is, on the one hand, a producer and supplier of fixed assets for all sectors of the economy, and on the other - a consumer of many of them. The rapid development of the construction industry entails a chain of other industries, which has a positive impact on the state of the economy as a whole, solving problems of economic and social importance.

Analysis of recent research and publications. Problems of functioning and development of enterprises of the construction industry in Ukraine have been studied in the works of L.V. Kulikov, N.A. Petrishchenko, N.V. Bibik, Yu. O. Belenkova, I. Chaly, T. Momot, D.L. Levchinsky, I.M. Malysch. At the same time, many questions about the current state and prospects of development of the construction industry are relevant, remain little covered in the scientific literature and require further research. The purpose of the study is to analyse the current state of the construction industry, to determine the factors influencing the development of construction companies.

The main presentation of the material. Construction is an integral part of human life. People have been involved in it throughout the history of its existence. Of course, like any other human activity, construction has been constantly improved, made more progressive, reliable and efficient. Today, progress in this area has become particularly noticeable. In the last few years, the construction boom has reached its apogee, and therefore, the appearance of most modern cities has changed almost beyond recognition. This is not surprising. After all, architecture is directly dependent on human needs and must fully meet the spirit of the times.

There are several key trends in modern construction. One of them is the constant increase in the number of storeys of buildings. The population of the planet is constantly increasing. In this regard, there is a need to make cities even more capacious. Since the possibility of achieving this goal due to the expansion of metropolitan areas is not possible today, the only way out is to "grow" high-rise buildings and skyscrapers. Therefore, both the appearance of houses and their internal planning are changing. Free planning is now increasingly used. People prefer to buy housing in the construction option. They place internal partitions at their discretion. In addition, quite often planning issues are resolved at the first stage of construction.

Another trend in modern urban construction is the reduction of living space. Today it is unpleasant to pay money for extra square meters. Many people prefer economy-class housing (or, to be more precise, forced to be satisfied with them). It is gratifying that in recent years, construction tends to use environmentally friendly, natural materials. People seriously thought about their health. They want safe and comfortable housing for themselves and their families.

Home automation and smart homes are becoming popular. This is a growing trend for both new and reconstructed buildings. Automated systems are becoming increasingly popular for temperature control, lighting or home security. The smart building offers its users more comfort and lowers consumption bills.

As people adopt a smart home, architects will need to decide how to integrate these systems into their designs. One of the most exciting applications of smart home technology is likely to be in the hospitality industry, as it will reduce energy consumption in the long run, as programming for each room can improve energy efficiency.

Artificial Intelligence (AI). Imagine a world where you can use computer systems to program robots, machines or to automatically calculate and design houses. This technology is already available and used today.

Robotics and drones. The construction industry is one of the least automated industries in which labour-intensive manual labour is the main source of productivity, so the question arises of developing appropriate robotics that would facilitate the work of mankind [5]. So far, the use of robots is in the experimental and initial stages. The key obstacle to this is the construction site itself, because the work requires a controlled environment and tasks that are repeated and unchanged. However, as we see construction sites become smarter, robots can be programmed and used. Here are some examples of how robots and drones are already being used on construction sites today:

- drones can be used to ensure safety on the site; they can monitor the sites and with the help of cameras can be used to identify any dangerous areas and provide the construction manager with a quick overview of the site without his physical presence;
- drones can be used to deliver materials to the site, which reduces the number of vehicles needed on site.

Brickwork and masonry are tasks in which you can use robots, improving the speed and quality of work.

5G and Wi-Fi 6. With the development of new technologies requires a strong and reliable backbone to connect, which provides higher speeds and large amounts of data. 5G is a fifth-generation wireless technology for digital cellular networks that provides higher speeds, better traffic handling and less congestion. In addition, Wi-Fi 6, the latest standard in Wi-Fi technology, is also improving over its predecessors. 5G and Wi-Fi 6 will allow users to communicate effectively, share large-scale drawings, run resource-intensive applications without compromising speed and performance. Not to mention providing a reliable and secure communication network that will use new and advanced technologies.

3D printing from concrete. By allowing a whole house to be printed on a 3D printer in less than 24 hours, this technology will change the rules of the game in the construction industry. Compared to traditional construction methods, this technology has obvious advantages in terms of reducing labour costs and materials. With more and more companies testing the technology to create new products, the 3D concrete printing market is expected to reach \$ 56.4 million in 2022. However, the technology is still in its infancy, so at this point the application of this technology is limited by its imperfections [4].

Information modelling. Building information modelling, commonly known as the BIM method, covers the creation and management of information about a construction project from start to finish. The process, based on the use of intelligent 3D models, allows you to build virtual projects before they are built physically. This technology has already become widespread among architects, engineers, estimators and other construction professionals who are trying to first visualize what the proposed building will look like in the end. The BIM method, which is currently the standard for many countries around the world, allows construction participants to more effectively plan, design, build and manage the building and its infrastructure.

Ecological design. Today, the whole world is trying to reverse the effects of climate change, so many construction companies are consciously switching to environmental design methods. In fact, sustainability is one of the main trends that will develop in the construction industry in 2022. Building codes force construction organizations to take measures to reduce the negative impact on the environment. It is expected that in 2022 and in the following years, the pursuit of efficient energy consumption and reduction of carbon emissions will continue to be a stimulus for innovation in the field of design, construction and architecture [4].

Conclusion. Therefore, the issue of modern technologies in the field of construction is constantly relevant and requires a systematic and innovative approach.

List of references

1. Levynskyi D. L. (2010). Obgruntuvannja osnovnych naprjamiv vdoskonalennja mehanizmu rehuljuvannja investycijnym procesom vidtvorenja mis'koho zhytlovoho fondu [Substantiation of the main directions of improvement of the mechanism of regulation by investment process of reproduction of city housing stock].

- Naukovi praci KNTU. Ekonomichni nauky, (17). Retrieved from: http://www.kntu.kr.ua/doc/zb_17_ekon/stat_17/59.pdf 13.
2. Pyvovarov K. V. (2009). Derzhavne rehuljuvannja j stymuljuvannja v sferi zhytlovoho budivnytva [State regulation and incentives in the field of housing]. Derzhavne upravlinnja: udoskonalennja ta rozvytok, (4). Retrieved from: <http://www.dy.nayka.com.ua/?op=1&z=250>
3. S. Zapototsky, Dr. Geogr. Sciences, V. Zapotocka, Associate Professor, I. Gorin, (2014). Tendentsii i perspectivu zhutlovogo budivnitsva v Ukraini [Trends and prospects of housing in Ukraine], Kyiv, 46-48
4. <https://mcet.com.ua/7-potuzhnih-trendiv-jaki-ochikujutsja-v-budivelnij-galuzi-u-2022-roci/>
5. <https://tuexpert.com.ua/ua/articles/stroitelnie-tendencii-2019>
6. <https://nv.ua/ukr/ukraine/sovremennaya-arhitektura-chastnogo-doma/yak-pobuduvati-budinok-iz-suchasnoyu-arhitekturoyu-ekspert-50195995.html>

Dmytro Bilous - student of group B-21 b of the Faculty of Civil Engineering, Construction and Ecology of Vinnytsia National Technical University, Vinnytsia, e-mail fish1524@ukr.net

Stoliarenko Oksana Vasylivna Candidate of Pedagogics, Associate Professor at the Department of Foreign Languages oksanny-81@ukr.net